UMO 1482.1 PATENT

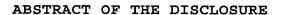
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Provided are nucleic acid coding sequences and methods utilizing these sequences for optimizing levels of substrates employed in the biosynthesis of copolymers of 3-hydroxybutyrate (3HB) and 3-hydroxyvalerate (3HV) in plants via manipulation of normal metabolic pathways using recombinant techniques. This optimization is achieved through the use of a variety of wild-type and/or deregulated enzymes involved in the biosynthesis of aspartate family amino acids, and wild-type or deregulated forms of enzymes, such as threonine deaminase, involved in the conversion of threonine to P(3HB-co-3HV) copolymer endproduct. These enzymes are used in conjunction with the $E1\alpha$, $E1\beta$, E2, and E3 subunits of plastid pyruvate dehydrogenase complexes and branched chain oxoacid dehydrogenase complexes or mitochondrial dihydrolipoamide dehydrogenase E3 components to enhance the levels of threonine, 2-oxobutyrate (α keto-butyrate), propionate, propionyl-CoA, β ketovaleryl-CoA, and β -hydroxyvaleryl-CoA. Also provided are methods for the biological production of P(3HB-co-3HV) copolymer in plants utilizing the enhanced levels of propionyl-CoA produced therein. Introduction into plants of an appropriate β -ketothiolase, a β -ketoacyl-CoA reductase, and a PHA

25 synthase in combinations with the aforementioned enzymes will permit such plants to produce commercially useful amounts of P(3HB-co-3HV)

30 copolymers.